

**MINISTRY OF AGRICULTURE, FISHERIES AND FOOD
DIRECTORATE OF FISHERIES RESEARCH**

FISHERIES RESEARCH TECHNICAL REPORT

No.89

Revision and analysis of anglerfish (*Lophius* spp.)
landing statistics for England and Wales

J. M. ELSON, S. I. ROGERS, D. J. SYMONDS and S. FLATMAN

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1. Introduction

Two species of anglerfish are caught in the United Kingdom fishery, *Lophius piscatorius* L. and *L. budegassa* Spinola. Biologically, and from a stock assessment point of view, it is necessary to separate the anglerfish landings into the two species but the catch statistics for anglerfish, as published at present in Sea Fisheries Statistical Tables, 1974-1986 (MAFF, 1975-1988) and Bulletin Statistique des Pêches Maritimes, 1974-1984 (ICES, 1977-1986), are for both species combined.

The introduction of precautionary total allowable catches (TAC's) for ICES Division Vb and Sub-areas VI and VII in 1984, an increase in UK landings and the high value of the fish has led to renewed interest in the biology and exploitation of anglerfish. However, initial inspection of the UK anglerfish landing statistics showed that these statistics were unreliable.

This paper briefly outlines the methods used to revise the England and Wales landing statistics, discusses the fisheries for anglerfish, with special attention to that in south-west England, and summarises present research work in the UK.

2. Revision of catch statistics

In England and Wales anglerfish are landed either whole, with heads on and gutted, or as tails only. The introduction of new recording forms in September 1983 allowed the presentation of the landed fish (i.e. whole, gutted or tails) to be recorded so that the relevant raising factors could be applied to obtain whole weight. Before September 1983, presentation was sometimes ignored when the landed weights were recorded and, when processed, they were all assumed to be gutted weights.

Such inconsistencies in recording practices were noticed when the prices per tonne for various ports were compared (Figure 1). The price per tonne of anglerfish from some ports in the south-west of England (Newlyn, Plymouth and Brixham) was apparently 2-3 times that of two other ports (Milford Haven and Fleetwood). However, anglerfish are landed differently in each area; mainly as tails in the south-west, but with heads on and gutted in Milford Haven and Fleetwood. Previous processing of the data did not take these differences into account which resulted in the anomalies in the unit price. Using relevant biometrical relationships, described below, and a knowledge of the landing and recording practices at English and Welsh ports (Table 1), a full revision of landing statistics was made for the period from 1974 to August 1983.

The conversion factors needed to obtain estimates of landed whole weight are a factor for tail to whole

weight and one for heads on, but gutted, to whole weight. These factors have been obtained from measurements of fish caught on research vessel cruises in ICES Sub-areas IV, VII and VIII in 1984 and 1985 and are given in Table 2. The conversion factors for the two separate species, *L. piscatorius* and *L. budegassa*, are significantly different. The factors for samples of unsorted anglerfish obtained by Bedford *et al.* (1986), also given in Table 2, are significantly higher than for either species – caused, most likely, by differences in tailing and gutting techniques before weighing. The techniques, on which the hitherto unpublished data of Table 2 are based, are thought to reflect more closely the commercial practices and presentation of anglerfish on the market.

The catch of anglerfish is presented as tails mainly in the ports of south-west England and it is from here that vessels have most opportunity to catch *L. budegassa* since this species is found primarily in the deeper waters of the Celtic Sea and towards the edge of the continental shelf in Sub-area VII. From market sampling carried out in 1985 at Newlyn, Brixham and Plymouth, where the majority of UK landings are made (see Table 4), the proportion of *L. budegassa* in the total catch was estimated as 26.5% at Newlyn and 3.29% at Brixham and Plymouth. A 'mixed species' tail weight to whole weight factor was calculated as 3.07 by weighting the relevant raising factor by the proportion of the two species in the catch at each port.

Most of the anglerfish landed as gutted only are caught in the North Sea (63% in 1985) where *L. budegassa* is relatively uncommon. A combined gutted weight to

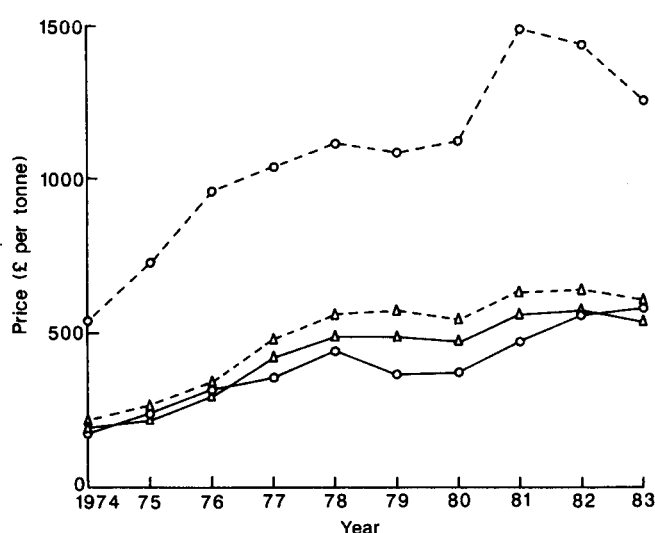


Figure 1 Comparison of price per tonne of anglerfish before (---) and after (—) revision. (O = Newlyn, Plymouth and Brixham; Δ = Milford Haven and Fleetwood).

Table 1 Normal methods of presentation of anglerfish on the market in each MAFF district

District	Coastal area	Normal presentation
North-eastern	Berwick-Redcar	Gutted
Humberside	Redcar-Donna Nook	Gutted/tails
Eastern	Donna Nook-Thames	Tails
South-eastern	Thames-Lyme Regis	Tails
South-western	Lyme Regis-Fowey	Tails
	Bude-Chepstow	Tails
Western	Fowey-Bude	Tails
Wales	Chepstow-Connahs Quay	Gutted
North-western	Connahs Quay-Scottish border	Gutted
'Spanish' landings	All areas	Gutted

Table 2 Conversion factors to whole weight for the two species of anglerfish from: (i) gutted fish; (ii) tails. The standard error is given in parentheses.

Species	Source	Conversion factors		Sample size
		(i)	(ii)	
<i>L. piscatorius</i>	Unpublished	1.230 (0.0049)	3.139 (0.017)	499
<i>L. budegassa</i>	Unpublished	1.166 (0.0066)	2.754 (0.032)	184
"Mixed species"	Bedford <i>et al.</i> (1986)	1.277 (0.0069)	3.451 (0.029)	220
" "	This report	1.25	3.07	

whole weight raising factor was, therefore, taken as a convenient 1.25, the mean of the raising factor for *L. piscatorius* and "mixed species" of Bedford *et al.* (1986), which was predominantly *L. piscatorius* but probably included several *L. budegassa*.

A special problem arose in 1980 when some Spanish vessel owners either re-registered their vessels in the UK or bought UK-registered vessels, in order to comply with European Community (EC) regulations and yet fish within the EC 200-mile fishing zone. In 1980 and 1981, these vessels landed a significant proportion of anglerfish at UK ports, but sold directly to a Spanish market, and the form and presentation of their catches did not necessarily follow the usual presentation for the port of landing. The landings reported by these vessels have been taken as being correct for the purpose of revision and the presentation has been assumed to be heads on and gutted.

The catch data given in this paper, therefore, represent an approximate, but much improved, estimate of UK landings of anglerfish for the period from 1974 to 1986.

3. Landings in England and Wales

The corrected landings by UK vessels in England and Wales from 1974 to 1986 from different ICES Sub-areas are given in Table 3; the unrevised total landings are included for comparison. Total landings increased steadily from about 1600 t in 1974 to a maximum of 5700 t in 1983, but a marked decline in landings has occurred since then. These changes have been influenced mainly by the fishery in Sub-area VII which showed the same steady expansion until 1983. The fisheries in other areas have generally declined although there has been an increase in landings from the North Sea (Sub-area IV) in recent years.

The relative importance of the main landing ports for anglerfish is shown in Table 4. It is clear that ports in south-west England handle the bulk of anglerfish and, in fact, over half the landings since 1981 have been made at just two ports (Brixham and Newlyn). The importance of the North Sea ports of Grimsby and Lowestoft has decreased since 1974 reflecting the decline in the fisheries in Sub-areas IV, V and VI (Table 3).

Table 3 Corrected landings (whole weight in tonnes) of anglerfish in England and Wales by UK vessels from ICES Sub-areas, 1974-1986. (+ = landing less than 0.5 t). Unrevised total landings are given for comparison.

ICES Sub-area	Year													
	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	
II	0	0	0	0	0	0	0	0	0	0	3	+	+	
IV	591	765	864	831	824	734	622	368	314	389	465	531	554	
V	185	139	154	42	29	9	8	0	0	0	+	+	0	
VI	71	77	142	196	151	88	193	79	87	65	58	89	62	
VII	749	945	1020	1083	1443	2153	3557	3779	4146	5239	4965	3654	2476	
VIII	0	0	0	0	0	0	0	4	+	0	0	0	0	
Total	1596	1926	2180	2152	2447	2984	4380	4230	4547	5693	5491	4274	3092	
Unrevised total	1008	1125	1263	1234	1310	1470	1931	2006	2277	3398	5319	4133	3051	

Table 4 Corrected landings of anglerfish by UK vessels at the most important ports in England and Wales in 1974-1986, as a percentage of the total landings.

Port	Year													
	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	
North Shields	5.6	6.2	4.7	3.9	5.2	3.8	2.0	0.7	0.6	0.8	1.3	1.9	3.3	
Grimsby	23.7	17.9	17.7	13.8	13.3	8.5	4.0	2.0	2.2	1.5	1.8	2.6	2.0	
Lowestoft	17.9	19.4	20.5	16.2	13.2	8.0	4.9	2.6	1.3	1.0	0.9	2.4	4.7	
Brixham	6.2	5.8	4.4	5.3	9.8	14.8	17.1	20.9	23.5	29.5	22.9	19.4	15.5	
Plymouth	2.1	6.2	4.6	5.2	8.8	7.7	8.3	7.4	13.6	10.6	9.2	5.8	4.4	
Looe	0.6	1.6	3.5	3.5	7.4	9.7	8.5	6.7	6.1	9.6	8.4	5.1	3.5	
Mevagissey	3.7	4.8	3.8	3.5	3.5	3.6	2.9	1.6	1.5	1.7	2.0	1.9	1.8	
Falmouth	2.8	1.5	2.8	4.8	3.5	3.9	11.6	13.2	3.8	3.4	4.0	2.9	4.6	
Newlyn	19.6	17.3	16.5	19.3	18.8	25.7	31.2	32.4	33.8	32.9	36.3	42.1	41.0	
Milford Haven	7.3	5.1	3.7	3.3	3.0	2.0	1.3	2.6	2.9	1.0	1.4	1.8	2.9	
Fleetwood	8.6	7.0	8.7	10.7	6.0	3.6	2.0	3.6	3.6	1.2	1.6	2.6	2.9	
Others	2.0	7.2	9.1	10.5	7.6	8.7	6.2	6.2	7.0	6.9	10.3	11.5	13.3	
Total landings (tonnes)	1596	1926	2180	2152	2447	2984	4380	4230	4547	5693	5491	4274	3092	

4. The fishery in ICES Sub-area VII

From information given in the previous section, it is clear that the recent UK fishery for anglerfish is concentrated in south-west England and centred on Sub-area VII. Therefore, the fishery in this area will be examined in more detail.

4.1 International landings

Since 1974, the three top countries for anglerfish landings from ICES Sub-area VII have been Spain, France and the UK, who together contributed over

82% of the total annual international catch. The variations in catches are shown in Figure 2 which has been compiled from data published by ICES (1977-1986) but with the inclusion of the revised England and Wales figures. The total international catch between 1974-1984 has averaged about 20,000 t per year but has shown large annual fluctuations. Generally, the French and UK catches have increased over this period, whereas the Spanish fishery showed a sharp decline in 1977. This was probably as a result of the EC's extension of fishing limits to 200 miles which restricted Spain's access to many important fishing grounds in ICES Divisions VIIg and h.

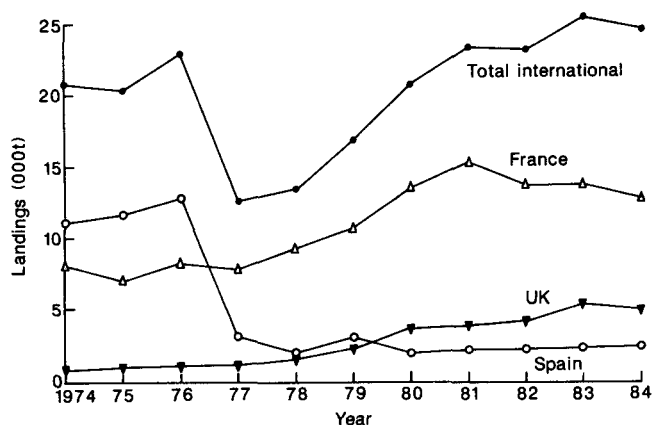


Figure 2 Landings of anglerfish from ICES Sub-area VII by country. (ICES, 1977-1986).

4.2 The fishery in the south-west of England

4.2.1 Landings

The corrected annual landings of anglerfish from each Division of ICES Sub-area VII by UK vessels for 1974-1986 are given in Table 5. The fishery has been dominated by the landings from the western English Channel (Division VIIe) and although it has lost its dominance of the late 1970's and early 1980's, half the landings still come from this area. A significant contribution also comes from Divisions VIIa and f-k.

The importance of anglerfish from Sub-area VII is also demonstrated in Table 5 by comparing their landings with those of total demersal species from the same Sub-area. In 1974 anglerfish made up just 5% of the total, rising steadily to reach a maximum of over 15% in 1983 and 1984. Although total demersal landings have remained steady in recent years, those of anglerfish have shown a marked decrease.

4.2.2 Ports and grounds

The important role of south-western English ports, particularly Brixham and Newlyn, has already been demonstrated (Table 4). The smaller vessels (less than 40ft) work in areas adjacent to their home ports; the larger vessels (over 40ft) from Brixham fish predominantly in Division VIIe whereas those from Newlyn, although normally working in VIIe, are also within a short steam of grounds in Divisions VIIf, g and h.

4.2.3 Fishing gear

Catches of anglerfish by different gear types for 1974-1986 are given in Table 6 for the smaller and larger (under and over 40ft) vessels separately. For the smaller vessels, otter trawls and various tangle and gill nets have been the most important catching methods throughout the period, with very little anglerfish being caught by other types of gear. The fishing gear used by vessels over 40ft, landing the majority of the anglerfish

Table 5 Corrected landings (whole weight in tonnes) of anglerfish in England and Wales by UK vessels from each division of ICES Sub-area VII, 1974-1986, and showing the proportion of anglerfish in the total demersal landings. (+ = landing less than 0.5 t).

Year	ICES Division								VII total	VII total demersal	Anglerfish % VII total demersal
	VIIa	VIIb-c	VIIId	VIIe	VIIIf	VIIg	VIIh	VIIj-k			
1974	150	+	1	483	107	4	4	0	749	14856	5.0
1975	130	+	3	645	133	24	10	0	945	15871	6.0
1976	130	0	2	708	151	16	13	0	1020	15918	6.4
1977	83	+	3	830	136	8	23	0	1083	15559	7.0
1978	85	0	8	1171	161	14	4	0	1443	16264	8.9
1979	86	0	15	1739	205	10	98	0	2153	17800	12.1
1980	106	+	20	2527	299	15	348	242	3557	23535	15.1
1981	147	20	23	2301	293	112	559	324	3779	26399	14.3
1982	188	32	45	2340	432	85	556	468	4146	28740	14.4
1983	135	0	40	4091	463	173	292	45	5239	32436	16.2
1984	137	3	100	3426	396	192	685	26	4965	31671	15.7
1985	120	1	75	2156	315	133	828	26	3654	30561	12.0
1986	79	21	61	1219	419	122	502	53	2476	30206	8.2

Note: Total demersal landings (MAFF, 1975-1988) are corrected for revised anglerfish landings.

Table 6 Corrected landings, by each gear used from UK vessels at all ports in south-west England, as a percentage of the total landings at these ports (+ = landings of less than 0.5 t): (A) vessels under 40 ft; (B) vessels over 40 ft.

Gear	Year													
	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	
(A) Vessels under 40'														
Beam trawl	0.0	0.0	+	0.0	0.0	0.0	0.1	+	0.2	3.2	7.0	1.9	+	
Otter trawl	40.6	28.2	29.4	27.0	48.0	59.9	71.7	72.5	66.2	62.6	60.2	55.9	32.2	
Tangle/gill net	58.0	70.8	68.8	70.8	48.2	39.2	26.8	26.2	32.5	34.0	32.4	41.1	67.1	
Dredge	+	0.5	0.3	0.5	0.2	0.2	1.0	1.0	0.3	+	0.2	1.1	0.6	
Other gear	1.4	0.5	1.5	1.7	3.6	0.7	0.4	0.3	0.8	0.2	0.2	+	0.1	
Landings (tonnes)	138	209	340	367	421	569	725	615	650	1092	1021	567	621	
(B) Vessels over 40'														
Beam trawl	16.3	11.9	7.2	9.8	19.1	42.2	48.0	50.5	54.9	76.3	76.2	79.2	80.0	
Otter trawl	79.8	74.3	66.7	58.1	50.7	47.1	47.4	45.2	41.8	20.0	17.6	16.3	13.2	
Tangle/gill net	3.7	9.1	12.2	12.5	5.2	1.9	0.5	+	+	0.1	0.1	0.3	2.8	
Dredge	+	2.6	8.8	16.0	22.0	6.9	2.0	3.1	2.2	2.4	5.2	3.5	3.4	
Other gear	0.2	2.1	5.1	3.6	3.0	1.9	2.1	1.2	1.1	1.2	0.9	0.7	0.6	
Landings (tonnes)	430	572	525	601	906	1457	2859	3348	3922	4126	3763	2942	1721	

in the south-west, are beam trawls and otter trawls. Beam trawlers have taken a steadily increasing proportion of the catch, from 7% in 1976 to 80% in 1986, while landings by otter trawlers have correspondingly decreased, from 66% to 13% over the same period. This had resulted from the expansion of the beam trawler fleet, with correspondingly larger increases in anglerfish landings from these vessels than by otter trawlers; the landings by both types of gear, however, have declined in recent years. In some years, significant landings of anglerfish have been taken by scallop dredge, gill and tangle net, seine net and line.

Vessels in both length categories are not necessarily restricted to one gear, the fishing method depending on the principal species being sought and any fishing restrictions currently imposed.

5. Discussion

Data are presented on the revision of the historical landing statistics of UK vessels in England and Wales, in the light of knowledge on the methods of presentation of anglerfish at different ports. Although these revised data are still only approximations, they

constitute the most reliable set of landing statistics available at present. A study of these statistics reveals that the major fishing for anglerfish is situated in south-west England, with the bulk of the landings coming from the western English Channel.

Recent work (unpublished) on the morphometrics of anglerfish in the UK fishery confirms earlier studies on the same species in Greek waters (Tsimenidis and Ondrias, 1980) which found that *L. piscatorius* and *L. budegassa* had different length-weight relationships and, therefore, probably different growth rates.

A study of trawl data from research vessel surveys in Sub-areas VII and VIII (Boon and Brander, 1985; unpublished) shows that, although *L. piscatorius* is the major species caught, *L. budegassa* makes up a significant proportion of the catches from grounds further west and south-west of the English Channel. These results are confirmed by a preliminary analysis of early samples taken during a market sampling programme which was implemented at ports in south-west England in 1985. It is hoped that further studies of these samples will go some way to describing the abundance and status of the two species of anglerfish in the UK fishery.

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